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EDITORIAL NOTES

THE TOWN AND COUNTRY PLANNING ACT

AFTER considerable alteration in Parliament, the Town and Country Planning Act, 1944, has reached the Statute Book, and few Acts have affected so greatly the powers of gas undertakings. The object of the Act is to confer wide powers upon local planning authorities, which are normally the local authorities of the area, to clear "areas of extensive war damage" or areas of bad lay-out (often referred to as blitzed and blighted areas). For these purposes planning authorities are given powers compulsorily to purchase the land of public uility undertakings, subject to an Order made by the Minister of Town and Country Planning, jointly with the Minister of Fuel and Power, and confirmed by Parliament.

It is well known that the basis of compensation laid down by the Act is, subject to important exceptions, the 1939 value; and if utilities hold land which is not, according to the somewhat cumbersome definition contained in Section 13, "public utility land," then compensation would be measured on this basis. Such land might include that held by an undertaking for eventual use. Where, however, the land is clearly " public utility land," the Act contains special provisions regarding compensation. The assessment will be made by a special tribunal consisting of a lawyer as chairman, a valuer and a civil engineer, together with a person having special knowledge and experience of gas undertakings. When a claim is made before this tribunal, the owners of an undertaking may choose whether they are assessed on the market value under the Acquisition of Land (Assessment of Compensation) Act, 1919—*i.e.*, broadly on the basis of a willing buyer and a willing seller—or whether they would prefer an assessment on the basis contained in paragraph 2 of the Fourth Schedule of the Act. This latter basis includes any decrease in net receipts together with any expenditure reasonably incurred in acquiring land, providing apparatus, erecting buildings, or doing work for the purpose of any adjustment of the carrying on of the undertaking rendered necessary by the proceedings of the planning authority. It would be possible to have part of the claim assessed by one method and part by the other.

If then a removal of population from one part of the area of a gas undertaking to another renders it necessary to substitute new mains for existing ones, the cost of the material and labour involved could be claimed. A more difficult case arises where the inhabitants are removed from the area of one gas undertaking into that of another; and an amendment to meet this case was moved in the House of Lords on behalf of the Conjoint Conference of Public Utility Associations. Although the amendment was not accepted, it is important to note that the Lord Chancellor stated that the Government fully realized the importance of the gas view, and proposed to deal with it at a later date by public general legislation. In such legislation the whole question of the removal of mains owing to housing, town planning, and highway reconstruction schemes will no doubt be reviewed, and a final settlement obtained with regard to a question which has been for long outstanding. In blitzed and blighted areas the scope of the reconstruction will no doubt be drastic, and the Act gives powers to the planning authority to extinguish rights of way in streets in these areas. These rights include those relating to the laying, maintaining, and repair of mains and pipes. The gas undertaking will, however, have the same right to claim compensation as in respect of compulsory purchase.

A novel feature in the Act is that which gives the Minister power on the application of the planning authority by Order (confirmed by Parliament) to require undertakings to lay mains to new housing sites on land which they have purchased under the Act. Although "compulsory mains" are not unknown in electricity legislation, Parliament has not normally compelled gas undertakings to provide mains in any specified locality. It is certain that every gas undertaking that anticipated a remunerative load would not require compulsion, and for this reason it is unlikely that in many cases such compulsion would be applied. Where, however, it was clear that the load could not be economic for a considerable period an Order might be necessary, and such an Order would normally give effect to "such financial arrangements between the local planning authority and the person carrying on the undertaking as they may agree or, in default of agreement, as may be determined to be equitable in such manner and by such tribunal as may be specified in the Order."

It is clear that the Act opens a new chapter in the relations between planning authorities and public utilities. We have given but the briefest outline of an exceedingly complicated Act, and undertakings would be well advised to keep a zealous eye upon the activities of their local planning authorities.

PUBLICITY

AS a general rule readers are not impressed by anonymous letters to the Editor, and in the "JOURNAL" we are always at pains to satisfy ourselves that good reason exists for the use of a pseudonym. We have in mind a letter which we published last week over the signature "Eno"—a letter fully worthy in robustness of the muscular hero of mythology. We published this unsigned letter not only because we were fully satisfied with the credentials of the writer, but also because it delineated a state of affairs which is causing widespread alarm and despondency in our Industry. "If we don't do something about publicity we'll go down the drain" is the picturesque verdict of an extremely knowledgeable member of the Industry who writes to us this week. "I like your leader on the electricity development plan; they have stolen a march on us again." This was from a north country reader, and the editorial comment to which he referred was, of course, our attempt to place in the right perspective the Press boost which had announced the £90 million electricity scheme. The fact remained that, whatever the perspective, electricity had scooped the headlines once more. Again, last week one of London's most read features—"*Star* Man's Diary"—discussed at considerable length the electricity industry's plans to adopt a universal standard voltage. The end of the story, it is true, revealed that this was something of a long-term reform, but even so the people were assured that benefits were in store for them (as they will be, in the opinion of many, when the Gas Industry can effect some unification of calorific values).

So we could go on multiplying examples without in the least exaggerating the discrepancy between the information which is reaching the public on the subjects, respectively, of electricity and gas. For this surely is the true modern meaning of publicity, and the Gas Industry is doing a grave disservice not only to itself and to those who have thrown in their lot with it, but also to the masses of public bodies and private citizens who are planning their dream lives of the future, if they are allowed to continue to be made non-gas—or even anti-gas—minded, by lack of gas publicity on a national scale. Publicity in these times is no sordid and untouchable thing. In fact, unless it is offered in interesting and informative shape the Press will not look at it. Nor is publicity in the true sense confined to advertising and

articles in the papers; this was made clear enough in "Eno's" letter. On the other hand coal and electricity have demonstrated to the full in the past twelve months that the Press is anxious enough to pass information on to the public when facts, figures, (or even at times attractive fancies) are available. To us within the Gas Industry it is abundantly clear that gas is by no means a dead letter, yet all our agitation in high places for freedom of choice will be of little avail if the public, which will ultimately have the choice to make, is misled through our own negligence into believing that the present and the future lie with other forms of fuel service. Our disproportionate share of the limelight can only mean that the Press returns a stony stare when it is asked to give its readers gas news, or that there is something sadly lacking in the Industry's machinery for purveying this and other well-established forms of publicity. We do in all seriousness suggest that the relevant national body, whichever it may be, should hold an enquiry on this specific subject. We suggest the matter is urgent—too urgent to await any longer the vague hope that "things will be better" after the reorganization envisaged in the Planning Report. We were all prepared a year ago to be patient for just a little longer on that account. Now we are asked to await the Report of the Committee of Enquiry. Our patience in this particular direction is exhausted, and in using these once familiar words we are echoing the sentiments of a very large section of the rank and file of the Industry, who increasingly complain that their local efforts, often excellently conceived, would be immeasurably strengthened by just that national background which we continuously fail to achieve.

MEETING AND CREATING DEMAND

WE have on many occasions said that a weakness of the Gas Industry is that it knows little of itself and appears to lack incentive to make good its own lack of knowledge of the facts relating to it. Filling of this gap is needed if we are to develop as we could and should, and we were glad to hear recently Mr. J. E. Davis emphasizing this point in a Paper, "Evolution of Fuel Supply," to the London Juniors. We gave the first part of the Paper in our issue last week and conclude its publication on later pages. We regard it as an absorbing contribution to current thought on how we stand as an Industry, and how in certain directions we should seek to strengthen our ability to develop. We must ascertain the facts and know how to interpret them, and there is need for statistical uniformity.

What, for example, do we mean by distribution costs? How can one interpret the cost of distribution in the returns of gas undertakings? Examination of the items which commonly go to build up the cost as expressed reveals that many of them are not related directly to the number of therms sold. The distribution system of mains and services is designed to meet maximum existing or likely peak demand. It may well be that the full capacity of the system is employed for less than 15% of the time; and this, of course, leads to the question of pressure drop on lengths of main, and the economics of installing service governors to increase the peak capacity of the mains. Again, it has been shown how with bulk transmission systems the use of local storage with constant intake can influence the economics of high-pressure distribution, making economically practical what would a comparatively few years ago have been thought uneconomic and unfeasible.

Then, how much attention has been given by the Gas Industry to demand characteristics? Mr. Davis pointed out that the electricity industry incurs much heavier capital charges in respect of both manufacturing and distributing plant per therm of maximum demand than does the Gas Industry. The electricity industry has studied closely the effect of diversity and coincidence of demand. As yet this study has not been made to any appreciable extent by the Gas Industry. To get full value from the capital invested in gas-making and distributing plant we need more facts—more facts concerning not just the connected demand of various appliances, but the peak hourly demand per consumer after allowing for the fact that all consumers do not use their appliances full on simultaneously. What, for example, do we know of the "after-diversity" factor of the instantaneous water heater? If a heater of the type has an hourly peak demand of, say, 160 cu.ft., it would not in the least follow that the installation of 1,000 heaters would result in a demand of 160,000 cu.ft. The "after-diversity" factor would obviously come into play.

We have often discussed the relationship between cold spells and peak load gas demand, and we are glad that Mr. Davis is with us in opinion that there is ample justification for the present policy of the Gas Industry in providing and seeking to encourage the use of coke to cover the peak demands of the winter months. "The advocacy of the use of coke in this manner," he said, "arises, not from the fact that we have coke to sell and therefore must persuade the public to use it, but because this is the most economical way of meeting the consumer's requirements at the present stage of evolution in fuel supply. By assisting the gas undertaking to operate in the most economical manner the consumer obtains his gas service at minimum cost." We would underline this, while agreeing with Mr. Davis that this solution may not be the right one in years to come.

Mr. Davis also shares our view that for the successful development of the Industry technical and economic factors cannot be divorced, that our approach to all problems must be by scientific method, through, as he put it, fact-finding, hypothesis, and experiment, and that the Industry will make its full contribution to the common good only if the engineer, chemist, physicist, and economist each contributes his special quota in a united effort.

APPEAL AGAINST SMOKE

AT the start of the year, discussing practical steps for the abolition of the smoke menace, with particular reference to that proved economic solution, gas and coke, we referred to the work and aims of the Smoke Abatement Society—work which, we pointed out, not for the first time, has been marked more by enthusiasm than affluence. Throughout the Society has enjoyed the support of the Gas Industry officially and of several gas undertakings individually. A considerable proportion of the funds of the Society has in fact been derived in this way, but the total annual funds from all sources have never topped the £1,200 mark; this was the high-peak income just before the war. Basic expenses having been met, there has been precious little left to undertake activities likely to kindle public opinion on this most important matter, to which is devoted such a volume of pious talk. It is obvious that one cannot do a great deal towards creating mass public opinion on, say, a couple of hundred pounds a year.

On the basis of meagre finance the Society has done much, and we have sympathy with an appeal which the Society has just put out for further practical support—an appeal which, we understand, has not fallen on deaf years as far as the national organizations of the Gas Industry and certain member gas undertakings of the Society are concerned; but with post-war housing and general amenity having, quite rightly, such prominence in current thought, the present seems particularly appropriate to ask for a much more widespread practical interest in the work by individual gas undertakings which hitherto have paid lip service but not in kind. Convinced of the value of its work, and undaunted by the small though continuous financial support it has so far enjoyed, the Society aims to develop its activities on a larger scale. We think the Society has during past years laid foundations firm enough to justify its hopes for the reconstruction period which lies ahead; and we have no doubt at all that in work of this nature an increasing income would be likely to be added to at an accelerating pace. The first step, of course, is to reverse the present rates between creative expenditure and basic costs.

The Society has set out its aims for the next five years. The programme, directed for the most part towards what may be termed "informed" opinion and organized groups—architects, politicians, teachers, women's organizations, youth and educa-

tion movements, and the like—is modest enough, but it is manifestly impossible to carry out the programme effectively on an income of about £1,000 a year. It seems to us that within its severe limitations the Society has proved itself a capable body. The present appeal it is issuing shows that, given backing, it is prepared to shoulder new responsibilities and attempt more ambitious tasks. The work, as we have said, is important, and it calls for more active participation in it by those engaged in the fuel industries; in which regard we look upon as a happy portent the conference to be held jointly early next year (the date fixed is Feb. 23) by the Institute of Fuel and the Society.

I.M.N.B.R.

It may now be revealed that a number of readers were perplexed by these initials appearing at the beginning of our Editorial last week on the R.A.F.* balloon barrage. We apologize for this lapse into the modern habit of abbreviation and the departure from our customary clarity of expression. In view of the fact that it was intended as a measure of paper economy and not the opening of a puzzle front, and in view also of an obvious clue contained in this apology, we do not propose to offer a prize for the first, or any, correct solution received.

* Royal Air Force.

"Gas Journal" Calendar and Directory

With the "GAS JOURNAL" CALENDAR AND DIRECTORY at an advanced stage of preparation, a fire at the printers last month destroyed quantities of the standing type, blocks, and even original copy. We have now been able to obtain a full report on the salvage position, and, in view of the great difficulties facing the Printing Trade, even without the addition of such a calamity as this, it was not easy to decide whether we should try to produce the full edition or an abbreviated form of it. In view of the very great popularity of this standard Annual, we have determined to produce it complete. It will be late, but "not as late as all that" judged by wartime standards. We know we can rely on the sympathetic forbearance of the Industry, and on endorsement of our decision to present the usual comprehensive reference to all its activities.

Personal

Mr. D. C. LORNIE has resigned his post as Chief Distribution Engineer of the Colombo Gas and Water Company, Ltd., Ceylon, a position he has held for the past 18 years. Prior to going to Ceylon in 1926 he was on the Distribution Staff of the Perth Corporation Gas Department, where he received his training under the direction of Mr. McLusky, later of Halifax, and the late Mr. D. Vass.

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Mr. RALPH S. JUTSUM, Deputy Chairman of the Weston-super-Mare and District Gas Company, has been appointed Chairman in the place of the late Mr. Henry Butt. Brigadier GORDON FLEMMING, O.B.E., M.C., D.L., J.P., has been appointed Deputy Chairman.

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Mr. FREDERICK WILSON, Deputy Engineer and Manager to the Middlesbrough Gas Department, has been appointed Engineer and Manager to the Darlington Gas Department. He will act temporarily as assistant to the present Engineer and Manager, Mr. A. E. Ruffhead, who is due to retire shortly. Mr. Wilson went to Middlesbrough from Burnley Gas Department in 1937. He started his gas engineering career at Darlington, moved from there to Middlesbrough, then to Stockton, to Burnley, back to Middlesbrough, and now returns to Darlington.

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Mr. N. T. FALLON, Distribution Superintendent to the Leyland Gas Company, has been appointed Assistant Resident Engineer to the West Yorkshire Gas Distribution Company. His successor at Leyland will be Mr. F. DAWSON, of Huddersfield.

Obituary

The death has occurred, after a long illness, of Mr. SIDNEY HOLE, Works Superintendent of the Bath Gas Company. Mr. Hole, who was 56, was the elder son of Mr. and Mrs. Walter Hole, of Torquay. He was born in Leeds, where his father was then Chief of the Distribution Department of the Leeds Corporation Gas Undertaking. He went to Bath in 1919 from Cardiff, and was appointed Chief Chemist of the Bath Gas Company, which position he held until he was promoted Works Superintendent in 1938.

Ministry of Fuel and Power

The Ministry has appointed Mr. C. H. Chester to the National Coal Board and to the Public Utilities Coal Committee, both appointments being in succession to Mr. S. Tagg.

An Association of Scottish Engineers

At a meeting in Glasgow on Nov. 15 it was decided to form an Association to be styled "The Association of Chief Gas Engineers and Managers in Scotland," a General Purposes Committee being elected as follows: Chairman, William Kirk, Motherwell and Wishaw; R. D. Keillor, Greenock; J. Scobie, Stonehaven; R. Cowie, Hawick; F. R. Mitchell, Lanarkshire; A. W. Brown, Alloa; and O. T. Longden, Armadale; with Mr. R. Congalton, Kilmacolm, Secretary and Treasurer. Fifty members have been enrolled, membership meantime being confined to chief officials. A similar organization exists in the North-West Area of England, confined to municipal gas engineers, but the new Scottish Association has decided to admit engineers of company-owned undertakings to membership.

A Constitution, previously drafted by the Salaries Committee set up by the three Commercial Sections in Scotland, was adopted. It indicates that the object of the Association is to protect and advance the interests of members, to maintain the welfare of the Gas Industry and increase the efficiency of the public service.

Greater South London Gas Corporation, Ltd.

We learn that the Hampton Court, the Eastbourne, and the Woking Gas Companies have become members of the Greater South London Gas Corporation, which, it will be recalled, was registered in September, 1943, and had as sponsors the South Metropolitan, the Wandsworth, and the South Suburban Companies.

Diary

Dec. 14.—Midland Junior Gas Association: Chamber of Commerce Buildings, Birmingham, 4.15 p.m.
Dec. 19.—B.G.F. Domestic Heat Services Committee: Gas Industry House, 2.30 p.m.
Dec. 21.—Fuel Luncheon Club: Luncheon at the Connaught Rooms Kingsway, W.C. 2, 1.10 p.m. Address by Dr. E. S. Grumell.
Feb. 23.—Institute of Fuel: Joint Conference with National Smoke Abatement Society.

The Date (given in last week's "JOURNAL" as Feb. 22) fixed for the forthcoming joint conference of the Institute of Fuel and the National Smoke Abatement Society is Friday, Feb. 23.

The Next Meeting of the Fuel Luncheon Club will be held on Dec. 21 at the Connaught Rooms, W.C. 2, at 1.10 p.m., when an Address will be given by Dr. E. S. Grumell, C.B.E., on "Coal: The Economics of Preparation and Utilization."

"Moon lighting" of the 0.02 foot candle standard was ceremoniously introduced at Chertsey on Dec. 4, when Mr. W. J. King, Chairman of the Highways Committee, deputizing for the Chairman of the Council, at a gathering of members and officials of the Council and representatives of the Chertsey Gas Consumers' Company around a lamp-post in the main street, turned on the first light in the town after five years of darkness. Mr. King referred with appreciation to the speed with which the Gas Company was implementing the Council's decision to introduce street lighting. A number of lamps were lit both at Chertsey and Addlestone on the same evening, and further lamps will be brought into use each night until the whole of the pre-war lamps are in use, which it is hoped will be before the New Year.

A Series of Papers on temperature control for heating and industrial purposes has been prepared by the technical staff of Sarco Thermostats, Ltd., for the assistance of works engineers, works managers, students, and others who are anxious to find out more about the various aspects of temperature control for heating and cooling. Automatic control has become increasingly necessary for economy of plant operation, and in many instances it is the answer to the problem of meeting the intensified fuel situation. During the war the demand for knowledge on the subject seems to have outstripped the supply of knowledge in the average industrial undertaking and service establishment, and there are many temperature control problems now awaiting solution. It is to help in their solution that an A.B.C. of Temperature Control has been prepared. No charge is made for the papers, but the supply is limited, and early application should be made to Sarco Thermostats, Ltd., Cheltenham.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in the "Journal" should not be taken as an indication that they are necessarily available for export.

Hydrogen and the Balloon Barrage

We described last week what had been done at a gas-works in Southern England in producing hydrogen for the balloon barrage. The following notes give rather more technical information about the processes used.

The catalytic conversion of water gas is used on a large scale for the production of hydrogen used in the hydrogenation of coal, oil, and tar. This process requires careful technical control, and is not well suited to intermittent production in small units. All the nitrogen present in the water gas appears in the hydrogen produced, and it is difficult, except in large units, to maintain the purity required for balloons.

Electrolysis of water, using a caustic soda electrolyte, is used for the production of the pure hydrogen required in certain metallurgical and chemical processes. It takes 140 kilowatts to produce 1,000 cu.ft. of hydrogen, and unless cheap current is available and an outlet can be found for the oxygen produced, the cost is high. Pure hydrogen is also available as a by-product of the electrolysis of brine in the caustic soda and chlorine industry.

The steam-iron process produces hydrogen, which is intermediate between the two in cost and purity. It can be operated efficiently in small units with water gas of normal quality. The plant involved is similar to a water gas plant, and the operations of manufacture and purification resemble those used in gas-works.

These factors led to the choice of the steam-iron process for the production of hydrogen for the balloon barrage in a large number of small units, to be installed and operated at gas-works throughout the country, using where possible existing supplies of water gas.

The process consists in the alternate passage of water gas and steam through a special type of iron ore, Fe_3O_4, at a temperature of 900°–1,050°C. Water gas is stored in a relief holder, from which it is passed either direct to the plant, or in some cases is purified first from hydrogen sulphide by iron oxide. The Fe_3O_4 is reduced to a lower oxide, probably FeO, both the carbon monoxide and the hydrogen in the water gas taking part in the reaction:

$$CO + Fe_3O_4 = CO_2 + 3\ FeO.$$
$$H_2 + Fe_3O_4 = H_2O + 3\ FeO.$$

There is some further reduction to metallic iron where the water gas comes first in contact with the iron ore.

The reactions are not complete, and the equilibrium mixture contains carbon monoxide and hydrogen. High temperatures favour the reducing reaction, but a practical limit is set by the tendency of the ore to fuse above 1100°C. The spent reducing gas is burned with added air in a recuperator to provide the heat necessary to maintain the process.

After a time the supply of water gas is shut off, and steam is passed into the plant through the recuperator and reacts with the reduced iron ore to give hydrogen:

$$H_2O + 3\ FeO = Fe_3O_4 + H_2.$$

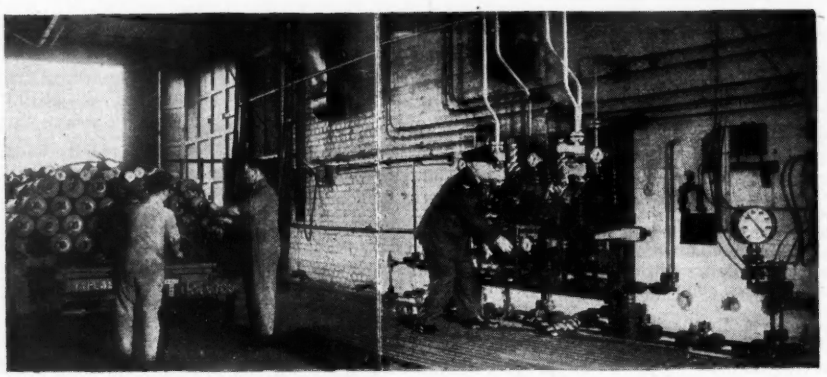
This reaction is also not complete, and is adversely affected by high temperature, so that the outgoing hydrogen contains a considerable proportion of undecomposed steam. The crude hydrogen is passed through a washer cooler into a relief holder, from which it is pumped through the purification system to the storage holder.

Any sulphur compounds in the water gas are taken up by the iron ore and liberated by the steam as hydrogen sulphide. If impurified water gas is used there is an increased load on the hydrogen purification system, but there are no adverse effects on the life or efficiency of the iron ore.

The hydrogen is purified by iron oxide for H_2S followed by lime for CO_2. In another process sodium carbonate solution, recirculated and aerated, is used for removal of hydrogen sulphide, followed by caustic soda solution to take out the carbon dioxide and the last traces of hydrogen sulphide.

The iron ore used is a specially calcined and selected Staffordshire Blackband, which combines high porosity with resistance to the disintegrating effects of alternate oxidation and reduction.

Air Commodore P. L. Lincoln, D.S.O., M.C., Deputy A.O.C. Balloon Command, congratulates the Board of a Southern Gas-works on their efficient production. On his right is Mr. A. E. Sylvester, Chairman, Gas Advisory Committee.



R.A.F. and Gas-works personnel co-operate in loading the compression cylinders with hydrogen.

Description of Plant

Earlier plants of the Lane type in which the iron ore was contained in externally heated iron retorts have now been superseded by the internally heated types. In principle these are all similar, consisting of a brick-lined steel vessel (the generator) with the ore resting on a layer of broken brick, which acts as a preheater for the reducing gas, and a recuperator consisting of a cylindrical vessel filled with chequer bricks. The recuperator may be mounted on top of the generator or alongside, or it may be placed in the centre of the generator, with the ore occupying the annular space between the wall of the recuperator and the brick-lined shell.

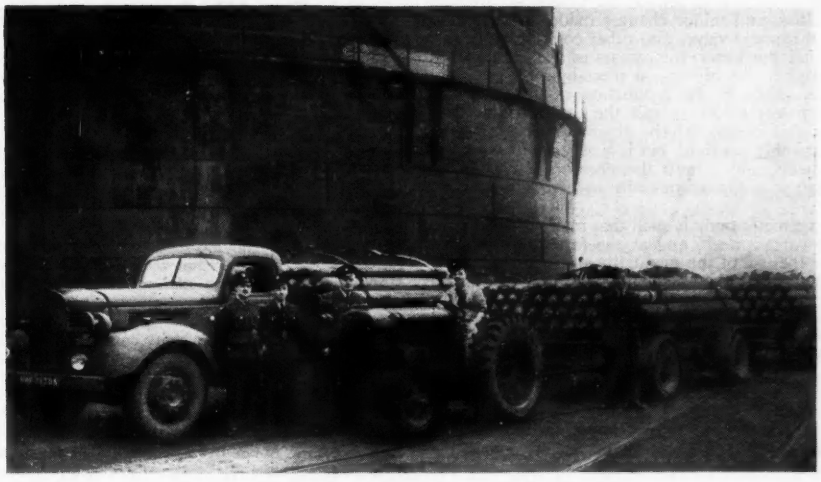
The whole cycle is carried out in ten minutes, of which 50–60% is occupied by the reducing stage. This is followed by a short purge with steam, requiring 10–30 seconds, and the remainder of the cycle is occupied by the steaming stage.

In some plants the control is by means of a mechanical operator, but manual control is quite satisfactory in the relatively long cycle used.

The generators take a charge of 6 to 10 tons of ore, according to type, with an output of over 1,000 cu.ft. of hydrogen per hour per ton of ore. Under favourable conditions the steam consumption is 150 lb. per 1,000 cu.ft. of hydrogen.

Compressing Plant

The purified hydrogen is stored in a gasholder, from which it is sent to the compressors. These are of the two-crank vertical type with four or six stages, and are driven by gas engines or electric motors. The compressors are housed in a separate room with the drive taken through stuffing-boxes in the walls. The compressed hydrogen at 3,000 lb. per sq. in. is passed through a valve panel to one of a number of headers. Flexible armoured rubber hoses are used for coupling with the cylinders mounted on the road vehicles on which they are carried to and from the balloon sites.



An R.A.F. convoy of hydrogen cylinders about to leave a Southern Gas-works for the Balloon Barrage Centre.

Sheffield's Centenary

The Sheffield and District Gas Company celebrated its centenary on Dec. 1—which was also the birthday of Mr. Ralph Halkett, its Managing Director—with a luncheon at the Royal Victoria Station Hotel, at which tributes were paid by heads of Government Departments and Services, and national and local industrial leaders, to the Company's remarkable growth and its efficient management and enterprise.

The history of the Company was reviewed by Mr. TOM SMITH, Parliamentary Secretary to the Ministry of Fuel and Power, who, in proposing the toast of the Company, said gas was first supplied at Sheffield in 1820, when the undertaking paid 10s. a ton for coal and charged 12s. per 1,000 cu.ft. for gas. At one time the price of coal fell to 7s. 10d. and gas was sold at 5s. per 1,000 cu.ft. In 1844 the Company amalgamated with the Sheffield New Gas Company, incorporated nine years earlier, and became the Sheffield United Gas Light Company. At the date of the amalgamation both companies charged 6s. 8d. for gas and paid 8s. 6d. per ton for coal.

By the end of the nineteenth century the Company was supplying 2,500 million cu.ft. of gas a year to 60,000 consumers at prices ranging from 1s. 6d. to 1s. 10d. per 1,000 cu.ft., and by 1913 the sales had increased to 4,500 million cu.ft. to nearly 100,000 consumers at prices ranging from 10d. to 1s. 3d. From 1927 the Company greatly increased its purchases of coke oven gas, and from 1930 practically ceased to make its own gas. It had already obtained power to purchase gas from outside its area of supply, but the Sheffield Gas Act, 1931, greatly extended that power and authorized the creation of the Sheffield Gas Grid, as the result of which the sales of gas exceeded 10,000 million cu.ft. in 1938, and last year that total was surpassed by 50%. To-day 80% of the total load is industrial and 20% domestic.

Mr. Smith emphasized that in the great expansion of the undertaking Mr. Halkett had played an important part, and on behalf of all the guests at the luncheon he extended to him best wishes for "many happy returns."

Colonel Sir HENRY STEPHENSON, Chairman of the Company, in responding to the toast, read a message from Major Lloyd George, Minister of Fuel and Power, in which he wrote: "The Company has been a pioneer in promoting the collection and distribution of large supplies of coke oven gas, and this has led the way in pointing to an improved use of the nation's fuel resources. Looking back, we can now see that the coke oven grid to serve the Sheffield area was only carried out in time, and that the development of the war effort in that area would have been more difficult if the Company had not constructed the grid and operated it for several years before the war. Your undertaking has also done great work in developing the use of gas for industrial purposes. The low price has enabled the great industries of Sheffield to increase fourfold their consumption of gas in ten years, which is a remarkable achievement. The benefit of this large scale development is clearly shown in the fact that the average price per therm received by the Company was lower in 1943 than in 1933." The Chairman also read a letter from Mr. A. V. Alexander, First Lord of the Admiralty, paying tribute to the maintenance of gas supplies for the Sheffield industries, whose output was essential to the fighting efficiency of the Navy.

Sir Henry Stephenson, a Director for nearly 50 years and Chairman for over 25 years, said Mr. Halkett became General Manager within a year after the end of the last war, and his restless energy and resourcefulness meant that it was not long before things began to move. The grid, constructed under Mr. Halkett's supervision, had proved a blessing to Sheffield and its industries, especially during the present war, and Mr. Halkett deserved full credit for it. In a report to the Committee of Enquiry into the Gas Industry the Company had stated its views frankly on the policy of integration. There were far too many undertakings whose resources were inadequate for the provision of an efficient service. Sheffield had absorbed a number of them in recent years, always to the advantage of the consumer in quality, service, or price, and usually in all three.

Mr. S. E. WHITEHEAD, President of The Institution of Gas Engineers, who proposed the toast of "The City and Trades of Sheffield," conveyed to the Company the hearty congratulations of the Institution, and the Lord Mayor (Councillor G. E. MARLOW), replying, said the Company had a vital contribution to make to Sheffield's future prosperity. The Master Cutler (Mr. W. W. WOOD) also replied.

Other speakers were Lord RIVERDALE, who proposed the toast of "The Guests," and General Sir WILLIAM BARTHOLOMEW, Regional Controller, who responded.

Meter Development and Construction

We have received a communication from Mr. J. H. Bingham on this subject. "The publication," he says, "of Mr. Currier's recent Address on 'The Gas Industry—Four Major Problems,' in which he advocates, *inter alia*, research into the design and production of dry gas meters with the object of reducing to a minimum the amount of solder consumed in the assembly of the appliances, makes opportune the occasion to describe an innovation in gas meter construction which will go far towards meeting this requirement." Mr. Bingham continues:

The dry gas meter is a sheet metal construction, but although considerable progress has been made in the fabrication of sheet metals, and scientific methods of production are being applied widely throughout the sheet metal industry, the Gas Meter Section seems to me to have failed so far to move with the times. It is remarkable that the pattern and methods of manufacture of the dry gas meter are still fundamentally the same as they were a century ago. Judged by modern standards, the sheet-metal cased meter appears antiquated. The design of the meter has come to be regarded as immutable.

Apart from dimensional variations introduced from time to time to give increased capacities, and minor changes made in the design and disposition of the three-port valves and other component details in order to minimize frictional losses, the carcass of the gas meter is now as it has been throughout its history—a piece-by-piece assembly held together by solder. Even in the production of the large tin-plate cased industrial meters solder is still the exclusive building medium. Not only is this comparatively expensive tin-lead alloy required to make the assembly gas-tight, but it is relied upon to unite the sheet metal components, and it must therefore be of high-grade composition, and applied in sufficient quantity to give strength and rigidity to the structure.

The construction of the meter body is such that many of the seams or joints lie within the carcass itself, and as the formation of these can be effected only by the use of the manually controlled soldering iron, the amount of solder expended on each joint or seam is determined by the skilled worker employed on the particular job. It is obvious that when built in this manner, employing high grade labour and using expensive material as a metallic cement, the production is both costly and uneconomic.

A new type of gas meter body is the subject of an invention for which Letters Patent have been granted to me. I may say that I have been engaged for many years in the gas meter industry. The objects of the invention are to reduce the amounts of expensive materials and skilled labour required in the manufacture of the meter, and at the same time to provide a more robust construction.

The component parts of the body are so designed that all the joints in the carcass assembly are constituted by outwardly presented flanges, which may very readily be permanently fixed together by spot-welding, working entirely from the outside of the body and without the exercise of any great degree of skill. The joints of the flanges are made gas-tight by running solder in between the faces of the flanges with the aid of a blow-lamp or by the hot-dipping process. As the solder used in this type of construction is not required to give strength or rigidity to the formation, but functions only as a sealing medium, an alloy having a much lower tin content than that which is essential in the orthodox method of gas meter construction can be used with advantage. The technique of construction applied to the meter body is one which is now commonly used for sheet metal containers of many types, and it can be carried out entirely by unskilled labour. The adoption of spot-welding for the fabrication, and the hot-dipping process for joint-sealing, provides the means for making meter cases more cheaply and more quickly than by the present methods, which require the services of skilled gas meter makers.

For post-war reconstruction the requirement of gas meters will be very great, and in order to meet the demand an appreciable expansion in the productive capacity available for these appliances must be planned. Mass production technique can be applied to the new form of body construction, and it is anticipated that there will be adequate capacity of the appropriate type available in the general sheet metal working trade to supply the necessary spot-welded cases should the gas meter section of industry as at present constituted need assistance in this direction.

The completion of the meter is also largely a matter for the utilization of unskilled and semi-skilled labour, as, apart from the valve unit, which conforms to the orthodox practice in so far as it is a soldered-up piece-by-piece tin-plate construction, the internal arrangement of the meter consists of a number of sub-assemblies located and held in position by the aid of screwed components.

Should limitations in the supply of tin preclude or render undesirable the use of tinplate in the production of gas meters, cases for meters in accordance with the invention can be assembled from uncoated sheet steel components. If this class of material is used, economy in the consumption of tin is effected to the fullest possible extent, but meters so constructed have to be painted internally, or covered with other protective coating against corrosion. For cases made from tinplate or terne-plate there is no need for subsequent protective treatment, and when either of these two materials is used, the sealing of the joints may be accomplished with the aid of solder creams or pastes if desired, without resort to the hot-dipping process.

The actual saving in cost of material which results from the use of uncoated steel components instead of tin-plate or terne-plate parts for the construction of the standard range of domestic meters is very small, and as the biggest economies are obtained from the method of building by spot-welding and seam-sealing without the aid of the soldering iron, which method is equally applicable to each of the three named materials, the use of tin-plate or terne-plate is to be preferred when either of these is available.

A sample meter made in accordance with the invention has been submitted to the Minister of Fuel and Power for examination and test, and a Certificate of Approval under Section 6 of the Weights and Measures Act, 1904, has been issued by the Minister in respect of the new type of construction. Similar samples have also been submitted for the consideration of the Gas Meters Committee of The Institution of Gas Engineers.

Arrangements for the quantity production of the spot-welded meter are now being made by Bingham Meter Patents, Ltd., 3, St. James's Square, London, S.W. 1, which Company is operating this and other patents granted in my name.

Gas Works Labour Problems

Mr. W. W. Marsh, C.B.E., Regional Controller for the Eastern Region (formerly Director of Establishment at the Ministry of Labour), in a short informal talk at the autumn meeting of the Eastern Counties Gas Engineers' and Managers' Association on Nov. 30, said that, as all gas engineers knew, there had been great general difficulties about labour, and those difficulties impinged very heavily on the Gas Industry, particularly in the matter of stoking. They had made many efforts to relieve the situation, and up to now they had succeeded fairly well, but the difficulty remained and there was no immediate prospect of its being relieved, though there had been helpful discussions between the Ministry of Labour, the Ministry of Supply, and the gas organizations concerned. There was one outstanding point, and that was the question of direction. He understood from the Ministry of Labour that a direction to a workman to attend at a certain works was not as precise as it would appear from the wording. A workman was directed to an occupation which was of a certain order of priority, and normally he would go to that particular occupation, but if there was another occupation of the same order of priority vacant at the same time he had a right to apply to be assigned to that other vacancy, and his appeal was one which had to be heard by a Ministry of Labour tribunal. On the general question of labour, they would know they had had serious difficulties about Italian labour, and those difficulties arose because they had not, in the Ministry of Fuel and Power, a precise assignment of Italians for their work, and they were obliged to release them, and had to make desperate efforts to get them replaced. Those efforts in the main had succeeded, but they were not always entirely successful. He understood that the Cabinet had decided that a certain number of serving soldiers and members of the R.A.F. who volunteered for work in the Gas Industry should be released for that work, and there was a prospect that some of them would be coming along fairly soon. He was told that the total number at present was about 2,000, but so far as he knew none of them had actually appeared, and he could only hope that the process would be expedited as far as possible. Another possible source of supply consisted of two shiploads of West African negroes on their way to this country, some of whom might supplement the supply of stokers in the Gas Industry, but the use of those men might present difficulties in the matter of accommodation, particularly in places like Cambridge or Newmarket. As Regional Controller he would like to assure them of all the help he could give them, because he realized as they did that they depended for the life of the country on the continued supply of fuels, one of the principal of which was

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Western Juniors

A Meeting of the Western Junior Gas Association was held at Weston-super-Mare on Nov. 25, when the works of the Weston-super-Mare and District Gas Company were inspected. Following the inspection, the visitors were entertained at tea, a vote of thanks to the Directors of the Company being proposed by Mr. A. Bell (Exeter) and seconded by Mr. T. Clapham (Bristol). Mr. W. J. Baker (Engineer and Manager) replied.

Members then adjourned for the business part of the meeting. The retiring President, Mr. A. Bell (Exeter), inducted the new President, Mr. A. B. Horsfield (Bristol), to the chair.

Mr. Horsfield presented the retiring President with a Certificate to commemorate his period in office.

A Paper entitled "The Maintenance and Working of a fully Automatic Carburetted Water Gas Plant, with particular reference to Clinker Control, at Canon's Marsh Works, Bristol," was given by Mr. J. R. Martindale.

Mr. W. E. Settle (formerly of the Bradford Gas Department) has been appointed Representative for the Industrial and Decorative Art Company, Ltd., painting contractors, of Mansfield. The Company specializes in the painting of gasholders and gas-works plant. This post is in addition to representing John E. Williams & Co., Ltd.

Research in the Gas Industry

Dr. J. G. King (Director of the Gas Research Board) discussed informally at the Autumn Meeting of the Eastern Counties Gas Engineers' and Managers' Association on Nov. 30 the programme of research by the Board now in progress and to be conducted in the immediate future.

In the first place, Dr. King said that Dr. Dent's Paper on the production of gaseous hydrocarbons by the hydrogenation of coal illustrated the care and endeavour necessary to bring forward from the laboratory stage an investigation of the type which might lead to the development of an entirely new project. It represented a form of research which involved the birth of a fundamentally new idea which had to be carefully nurtured and brought to full life later. Such ideas, when grought to fruition, had a much greater effect on industrial development than had painstaking research of a more organized character, but they could not be forced.

In a reference to collaboration, he made the point that there must be an organized pattern of research in which all could help. He asked that the Gas Industry should collaborate to the utmost with the research department, not only when asked to do so, but also by offering suggestions. The main components in an organized pattern were the researches of the Board, the researches of the larger gas undertakings which supported and had research departments, the industrial research centres (of which there were eleven), the work of the contractors who built plant and appliances, and Service laboratories. Added to that there was the work of the University specialist, who might be pursuing a particular line of work which was worth making use of in an industrial research association.

The research programme of the Gas Research Board, continued Dr. King, was very comprehensive. There were established processes in the Industry which were efficient up to a point. The Board had to determine whether further advance was possible, and where new processes such as that described by Dr. Dent could be added. Above all, it did not wish to continue polishing old pots, if no useful results were likely to be achieved thereby. Lack of staff and lack of a central station limited the effort at the moment, but the future would take care of that. There was nothing holding him back except lack of men, due to war conditions.

In a brief survey of the Board's activities, he asked the members of the Industry to say at any time whether they thought he and his colleagues were working on the right lines, whether they were dealing with the most urgent problems first, or whether there were other problems which were considered to be more urgent.

In the Report last year he had reviewed the researches they had been doing for some time, and which were carried on previously by the Research Group of the Institution. In this year's Report he would devote more space to progress made during the past year, and in future Reports would deal only with each year's progress.

The apparatus for the next stage of Dr. Dent's research was constructed by Messrs. Woodall-Duckham; the Board was greatly indebted to that Company and to Mr. Moon and the Management of the Bournemouth Gas Company for accommodating it in their works.

In connexion with the increase of scale from Dr. Dent's fundamental idea, the difficult problem was the dissipation of the heat of reaction in a manner which would permit of the evolution of a really practical full-scale method. Dr. Dent had stated that large particles of coal were not necessarily amenable to treatment; it might be necessary to use methods involving the use of small particles, such as pulverized coal, or methods of the type developed in the gasification of brown coal on the Continent, or those which had been used in the control of catalysts in the oil industry.

After illustrating the apparatus in use for the development of Dr. Dent's process to the next stage, Dr. King said it was more than probable that the final shape of the process on the manufacturing scale would be very different.

A second programme on which the Research Board was engaged was the synthesis of methane from carbon monoxide and hydrogen. That process had progressed from fundamental studies in the laboratory, and was about to embark on the intermediate stage. In that case again the researchers were faced with a highly exothermic reaction, the effect of which had to be carefully controlled. If it were not controlled, the activity of the catalyst employed was destroyed very quickly. The exothermic heat of reaction represented 25% of the heat of the raw materials used, and in translating it to the practical scale it would be necessary to find means of recovering a high proportion of that 25%; otherwise the process would fail as being thermally inefficient.

One collaborator in that stage was the Fuel Research Station of the D.S.I.R. The two groups had attacked the same problem in different ways, and their results were in a measure complementary and both valauable.

A third programme was concerned with the organic sulphur compounds of coal gas. That had started as a catalytic process with two lines in view, one being the purification of synthesis gas, and the other the removal of unwanted organic sulphur compounds from town gas. In this case also they had overcome reaction difficulties, and had reached the stage of examining the effect of increase of scale.

Therefore they were on the point of constructing an inter-scale apparatus, which they would put to work in order to ensure that those difficulties were under control before they attempted work on the pilot plant stage. The intermediate scale involved a catalyst chamber of 1 cu.ft. capacity, which would deal with 50,000 cu.ft. per day.

In addition to problems of gas production and purification there were problems of gas utilization. Owing to lack of a central research organization, he had secured accommodation at the Royal College of Science and Technology at South Kensington, where he had been given facilities to start research on one or two programmes.

First there was the fundamental study of the combustion characteristics of unusual or unorthodox gases, such as those which Dr. Dent might produce by his process, perhaps rich in methane or, going to an extreme, even mixtures of methane and nitrogen.

Secondly there was the study of so-called non-aerated burners. Later they might proceed to deal with aerated burners.

Thirdly, the corrosion of appliances was being studied, and in that work they were collaborating with a number of undertakings.

Fourthly, they would study what might be done with methane, if it became possible to extract it from coal gas, or total gas, or produce it by synthesis. In America new processes were coming in for the oxidation of methane and for chlorination to produce solvents, chemical intermediates, and materials of relatively high industrial value.

Returning to the physical studies, they were examining the variation in combustion characteristics of coal gases made throughout the country, using the A.T.B. and other methods as a first step in the evolution of a means of controlling the combustion characteristics, rather than the calorific value of town gas within limits which might perhaps be served by standard gas appliances. At the same time they were studying the distribution of organic sulphur compounds in coal gas.

A further programme covered the application of liquefaction to gases, the work being done in collaboration with one of the academic specialists, Professor Sir A. Egerton, who had a group working on the subject at South Kensington. The Gas Research Board had a representative working with him; Dr. King had access to that representative and to the remainder of Professor Egerton's programme. The work involved building special columns for removing from coal gas, or other gases, products such as methane by liquefaction at a low temperature. Liquefaction could be applied to Dr. Dent's process to recover methane from the gases; it could be applied to coal gas to take out methane, or to take out ethylene and propylene, which would have a ready sale in chemical industry.

A further programme was concerned with radiation. Professor Townend had studied it from the fundamental point of view—the emissivity of radiant surfaces and the absorptive power of the materials being heated. From those studies it was possible to evolve appliances using radiant heating or infra-red heating for special purposes. Information of that kind, as it was collected, was naturally being transmitted to organizations such as the Industrial Centres, where furnaces for different purposes could be constructed to meet those fundamental requirements.

Research on refractories was being carried out, as in the past, at the centre of refractory knowledge—*i.e.*, the Refractories Research Association at Stoke-on-Trent. That would be continued as a definite policy.

It had not yet been possible to start work on coke, but in the collection of programmes there were fairly defined programmes on coke. There were such problems as breakage and sizing, the comparison of the properties of screened and cut coke, the possibility of producing a more reactive coke either by modifying processes of manufacture or by subsequent treatment, such as activation with sodium carbonate. Dr. Dent had stated that in his process the coke produced in the hydrogenation stage was highly reactive. They might be able to modify other processes of coal carbonization to raise the activation to a rather higher level.

Lastly, they must have in the Research Board a group concerned with fundamentals and long-term research, supplemented by university contacts.

The pattern of research, concluded Dr. King, must be expanded to develop new processes, to improve existing processes, and to search through fundamentals for bright ideas which might be applied in any suitable direction. He invited the technical men in the Industry to suggest to him at any time new lines of attack for consideration.

The Precincts of Gas Industry House took on a martial air on Sunday, Dec. 3, when, unknown to each other, two famous battalions of the Home Guard chose Gas Industry House as the assembly point for the representative detachments they supplied for the Stand-down Parade and Review by the King in Hyde Park. The battalions concerned were the 40th London (Gas Light and Coke Company) Battalion and the 49th London (South Metropolitan Gas Company) Battalion. An interesting feature of both these battalions is that, in addition to the infantry companies, they formed special engineering companies trained on the lines of Royal Engineer Field Companies. Between them the G.L.C.C. and the S. Met. covered the whole of the London District with Home Guard Sappers, and carried out many engineering tasks which otherwise would have had to have been done by regular Sappers. When the time comes for these details to be disclosed, the work of these gas company Home Guard battalions will prove one of the most interesting accounts of the work performed by the Home Guard.

Evolution in Fuel Supply*

By J. E. DAVIS, South Metropolitan Gas Company

(*Concluded from p. 740*)

Three Major Groups of Costs

There are three major groups of costs, each influenced in different ways by different factors and, therefore, not necessarily bearing towards one another a constant relationship. The customer cost is that body of costs related to the total number of customers and, therefore, to the average single consumer is a constant, irrespective of the magnitude of his demand or the extent of his consumption. The demand cost is related to the maximum requirement for which provision has to be made in plant, equipment, and organization. The commodity cost is the bare cost of the gas, electricity, steam, or hot water itself.

Comparison between the cost groups of the different systems is not possible without an understanding of the technical differences between systems. If the existing costs incurred by the systems working at their present level of development were grouped in the manner suggested, and the figures then used to predict the probable cost likely in the event of expansion, some very erroneous conclusions could be drawn.

The group of costs known as the customer cost will always include a large proportion of management charges and all consumer service charges. It may, however, include other items.

In the case of electricity the distribution system is closely designed to meet the maximum demand, and if this demand is increased, additional or larger cables and transformers must be provided. The greater part of the annual charges on the distribution system falls under the heading of demand charge.

This is not so completely the case with gas supply. The mains and service system which is adequate to meet the cooker load can, at little extra cost, be made adequate for any demand that the domestic consumer is likely to make. Thus, the annual charges on gas distribution equipment may properly and conveniently be regarded as mainly a customer cost.

In the case of district heating systems the distribution equipment is very costly, and because of its nature and the nature of the service it provides must be designed in the first instance for the maximum demand likely to be experienced. The annual charges on this installation also fall to be regarded as a customer cost. In addition there is a continuous loss of heat from such a distributing system, and the value of the heat so lost in a year becomes a further addition to the customer cost.

As a direct result of these differences the demand group of costs for electricity includes annual charges for both generating and distributing plant. For gas and for district heating it includes almost wholly those of the production plant.

It should be noted that this only remains true so long as we are dealing with domestic consumers. Commercial and industrial consumers whose individual demand may be many times that of the domestic user will require different treatment.

It would be unwise to quote any figures for these groups of costs derived from existing practice, partly because sufficiently detailed information is not available, but even more because they might be quoted or used without the necessary reservations. Some idea of the relative magnitude may, however, be useful.

The customer cost for gas or electricity in an urban area is about the same for the two systems, and before the war would have been in the neighbourhood of £2–£3 per annum. The customer cost for a district heating system is likely to be much higher, would vary according to the density of demand in the neighbourhood, and might vary from £5–£15 per annum. The demand group of costs is highest in the case of electricity, being about four times that for gas, which in turn is about twice that for district heating. The commodity prices are approximately in the ratio of 7 for electricity, 2½ for gas, and 1½–2 for the heat in steam or hot water.

Without any more exact information than these figures provide it can be deduced that systems of steam or hot water supply may well prove advantageous where the density of demand is high and the peak load is high in relation to the average load. It is not a new piece of information that electricity requires a good load factor in view of its high demand costs, but it may not be so generally appreciated that the demand cost for gas is an item which needs most careful watching when new large-scale business is being sought. It raises the question whether the most suitable development of business in low-priced gas is for central heating of offices or for industrial uses where the seasonal load factor is much more satisfactory. This statement need not give rise to undue concern, because there are quite a number of ways in which the demand cost could conceivably be reduced in appropriate circumstances.

It may help in obtaining perspective on the issue of district heating if it is recognized that the objectives of schemes for providing heat by steam or hot water distribution are precisely the same as those of domestic gas supply. The issue fundamentally is whether gas or steam or hot water is the most suitable medium for the purpose. Gas can provide all the fuel services necessary in the house, but steam and hot water are limited to the provision of basic heating and hot water: they cannot supply heat for cooking or high temperature radiant heating. This is a very important point. The figures usually quoted as the weekly or annual cost of heat service by steam or hot water look quite moderate, but when the cost of supplementing this service by gas and electricity is added the appearance is changed considerably.

Gas is commonly regarded as too costly for basic heating in the winter months, and it is somewhat dearer than solid fuel used in independent appliances as we shall see, on account of the heavy capital investment required for manufacturing plant to meet the peak demand. Published details of district heating schemes show that a capital expenditure of £80 to £120 per dwelling is contemplated. With such a sum available, a gas undertaking could not only build the necessary manufacturing plant to meet the maximum demand, but also have a balance of £40 to £60 per house to provide appliances! The net commodity costs of gas and of heat in hot water at the point of production are slightly in favour of hot water, but losses in distribution would reverse the position and make gas the cheaper.

From the limited information that is available or can be deduced, it would appear that the Gas Industry's system of production and distribution is well placed to accept large developments, and much better placed than other systems likely to compete with it. This statement may require modification where special and unusual circumstances exist, but in general it is true, and particularly in respect of the supply of heat and heat service to the kinds of dwelling in which most people live.

The economic merits of gas manufacture and supply, arising from the technical principles involved, are most strongly developed in providing the services of cooking, water heating, the wash boiler, and solid fuel ignition. The provision of radiant heat for "topping-up" space heating, in supplementation to a background heating system or for use in mild weather, is another service which can be most economically supplied by the gas system.

Merits and Limitations

Every system, whatever its merits, has some limitations, and the provision of background heating in the climatic conditions of this country, where spells of severe cold are of short duration and unpredictable in their incidence, is difficult for any system of fuel supply from a central source. It means providing production and distribution plant adequate for the peak demand, but likely to be used only for a few days in the year. It is improbable that a gas distribution system would be overtaxed by such demands, for they are spread over 16–24 hours a day. It is the manufacturing plant which will experience the greatest difficulty. Exactly how great this difficulty would be, expressed in terms of money, requires further detailed study of demand characteristics and the means of meeting them, but from available figures, and with existing methods of manufacture, it would seem that the use of gas in complete substitution for solid fuel might increase the cost of fuel supply per family by something up to £5 in the year. This is not a large sum, particularly when it is remembered that the absence of solid fuel storage and solid fuel flues can save about 5% on the cost of building the house. It does, however, justify the present policy of the Gas Industry in providing and seeking to encourage the use of coke to cover the peak demands of the winter months.

In the Consumer's Interest

It is to be noted that the advocacy of the use of coke in this manner arises not from the fact that we have coke to sell and, therefore, must persuade the public to use it, but because this is the most economical way of meeting the consumer's requirements at the present stage of evolution in fuel supply. By assisting the gas undertaking to operate in the most economical manner the consumer obtains his gas service at minimum cost.

It is a most fortunate circumstance that, as an Industry, we are in a position to solve the problem of the domestic seasonal peak demand so neatly and with our own product, coke; but it is questionable whether this solution can be regarded as permanent. The decision rests with the public. If, through providing these services of cooking, water heating, and supplementary space heating, we demonstrate, as we shall, that labour saving and automatic control, combined with cleanliness in use, are merits of a fuel service that can be obtained by everyone at no great cost, we may well be faced with a demand that so excellent a service should not step short of completion. That demand would bring problems in its train, and since their solution cannot be found rapidly, it is simply a matter of prudent foresight to initiate investigations to-day that will meet these future problems when they arise.

This is the purpose of such studies as that now being made by the Gas Research Board of methods for the complete gasification of coal. They are intended to meet the situation that may well arise when supplies of coal of the quality best suited to present methods of gas production are not available in the quantities required, and when the

* Paper to the London and Southern District Junior Gas Association.

production of coke corresponding to the demand for gas may become in excess of the demand. It would be very surprising if any responsible person thought that these investigations were intended to revolutionize the Gas Industry overnight, and still more surprising if it were thought possible radically to change the customs of millions of people in a year or two. Changes will come, and preparation for these changes must be made well in advance of the demand for them. It is always important that a desirable line of development should not be retarded by the fear of future embarrassment. These studies should remove that fear from those who recognize the value of distributing and using fuel in gaseous form.

The project of complete gasification does not necessarily deal with the problem of peak demand, though in this and in cognate studies there are interesting possibilities. The peak demand for fuel for space heating is intense, but of short duration, and the total quantity of fuel involved is quite small. I estimate that, if gas were used exclusively for the heat demands of a house, the last 20% of the peak demand would represent an annual requirement of only some 5 therms per domestic consumer, and that the top 40% of the peak demand would represent only some 20 therms per annum. Is there any possibility of providing long-period storage as a solution to this problem?

Liquefied Gas for Peak Demand

In Cleveland, Pennsylvania, more than 2 million therms of natural gas (substantially methane) are held as a reserve storage in liquid form. On the estimate I have just given this represents 40% of the peak demand by 100,000 consumers. The figures given for the cost of this installation amount to about one-tenth of the cost of low pressure storage of equivalent capacity. Looked at in another way it would appear that the cost of providing such storage for liquefied gas amounts to about one-quarter to one-third the cost of providing carbonizing and purification plant to meet the peak load. This looks as though it might be worth further study. The technical achievement of liquefying methane is a matter of great interest to technicians; but where, when, and how this and many other technical feats will prove most helpful to the development of our Industry can only be decided by constant and thorough observation of all the technical and economic factors controlling the operation and development of the Industry.

Responsibility for Action

I confess that the scientific approach which I have discussed indicates what should be done, but does not do it. The doing is the responsibility of the engineer and the salesman. The engineer will not be disturbed by this appeal for scientific progress, for he is a technician, and will sympathize with the arguments and the consequences. In these consequences he will see opportunity for his technical skill. To the salesman, also, this method of approach is important, for it is his great responsibility to advise and educate the public in their own interests. If he understands how their interests are affected by technical and economic factors in the service they obtain and the money they pay for that service, he, too, may appreciate the soundness of evolutionary development within the guiding lines of scientific principles.

It is not enough for us, within the Gas Industry, to know that the system of fuel supply which we operate is the one most capable of meeting economically the demand for improved fuel service. The public must see it demonstrated in practice. Would it be too progressive to suggest that evolutionary development has already reached the stage when half the fuel requirements of a house should be met by gas and the other half by coke, and that in making proposals for fuel installations and equipment in new dwellings we should design for an annual use of not less than 240 to 300 therms of gas per annum?

DISCUSSION

Mr. **L. W. Andrew** (Gas Light) said that undoubtedly they were in need of more facts, but it was equally true that they did not make full use of the facts they already possessed. Mr. Davis had put before them a paradox—that while the quantity of energy needed to warm and light the normal house, to cook the food of the family, and to provide an ample supply of water for one year was contained in 1 ton of coal, actually 5 to 6 tons of coal were needed to supply this energy with current usage. Yet they knew that a better service at the same cost could be given by the Gas Industry with an expenditure of 3 to 4 tons of coal annually. These were the facts; yet the nation seemed bent on using the 5 to 6 tons. This was occurring when gas had no equal for cooking, refrigeraion, laundry, and radiant heating. That being so, why was the Gas Industry on the defensive? Its duty should be to tell the public the facts. Regarding the load factor, the obvious way to level the load was to use gas in summer for water heating and throughout the year for refrigeration. But was their business to be determined by the load factor? Take the gas fire. They should look upon the gas fire load from the point of view of the user; and rightly applied, what was the alternative to the gas fire? Solid fuel for the bedroom was an impossible solution, and electricity did not give the type of heat desired.

Mr. **Davis** suggested that the Gas Industry simply did not appreciate what an extraordinarily good showing it could and in fact did make, but there was room for better work by way of demonstration in the homes of the Industry's personnel. From the load-factor aspect, the combination of gas for summer water heating and of coke for the purpose in winter was excellent, and he would like to see a combination unit for carrying this out. And in regard to the bedroom gas fire, they were a public service and should endeavour, in spite of load factor, to satisfy the demand.

Mr. **D. A. Johnston** (South Metropolitan) thought the Paper bordered on the conservative and put forward an all too modest goal. He personally hoped the Industry would undergo a revolution. There seemed to be two different conceptions. The one, which prevailed, was to supply small quantities of heat at a high price by present processes and enjoy a moderate prosperity. The other, which appealed to him, was to supply heat on tap to meet all the needs of the public; and this implied vast expansion. The years ahead would be critical, and there would be a parting of the ways. They must go out for known objectives, and what was wrong in the Industry at present was lack of agreed purpose. They were not agreed that the whole of the heat service should be met by gas. If, for example, the aspect of load factor dominated their policy in regard to the space-heating load, then they would have a static, and hence a declining, Industry. They should accept the challenge and go out to meet it; and if they did accept the challenge, he was sure they would be able to meet it. While in other countries there was greater development in grid distribution of gas, extraction of hydrogen, recovery of liquid hydrocarbons, motor transport, and so on, the British Gas Industry lacked imagination, determination, and courage.

Mr. **Davis** expressed his firm belief that evolutionary methods were far preferable to revolutionary ones, though it was desirable that Britain should have more practical experience in such matters as the liquefaction of gases.

Mr. **P. G. Warne** (Portsmouth) said he was not happy about the suggestion that the capacity of many distribution systems could be quadrupled at insignificant cost, and he would like further explanation of what was meant by the "after-diversity" factor.

Mr. **Davis** said that three-quarters of the cost of the distribution network was along the streets in supplying the individual consumers, the rest of the system accounting for 25%. As to the after-diversity factor, let them take the example of the gas cooker. Full on—*i.e.*, with oven and hotplate in operation—the consumption was, say, 120 cu.ft. an hour. Suppose 1,000 consumers had gas cookers. Would the total hourly consumption be 120,000 cu.ft.? In practice this would not apply. The consumers would not all simultaneously use their cookers full on. In practice the load would be spread, and there would be a diversity factor of magnitude. That was why it was so necessary to study output curves.

Mr. **R. J. Pepper** (Gas Light and Coke) thought that perhaps district heating would be a future development of the electricity industry in an attempt to level their load. He mentioned the heating of the Earl's Court Exhibition buildings as an example of the use of electricity for central heating at off-peak periods—a system operated by the electricity supply undertaking at times favourable to the load. Could the Gas Industry, by supplying low-grade gas, develop the district heating load in competition? In regard to space heating, he felt the Industry had gone too far in pushing coke, and that it should press home the all-gas idea.

Mr. **Davis** remarked that the installation at Earl's Court was an example of the application of the electrode boiler, and when the supply was entirely off-peak it could be charged for at little more than cost. Other district heating schemes envisaged the use of hot water going to waste at the generating stations. At present the water was rejected at a temperature too low to be of use for district heating, but the temperature could be brought up by sacrificing the efficiency of electricity generation, and this brought in the question of matching the demand, using hot water for base heating and electricity for topping up and for cooking. But American schemes of this dual nature had been found uneconomic. He thought that perhaps something could be done in regard to district heating in, say, the centre of a town by the supply of producer gas specially for the purpose.

Mr. **T. S. Ricketts** (Tottenham and District) queried whether in marketing two products, gas and coke, gas was not in fact subsidizing coke. Much had been heard lately of the high-efficiency coal fire. How would this affect the gas fire, which owed much of its popularity to the low efficiency of existing coal appliances? And who was to arbitrate as to what form of fuel the consumer should use?

Mr. **Davis** said that the gas and coke combination could not be regarded as being ideal, and they should continue in their attempts to bring about the day when it would be possible to supplant solid fuel by gas. He would not offer a solution to the equation of the cost of supply of gas in relation to the cost of supply of coke. They might in the future expect greater competition from coal appliances having higher efficiencies, but the figures so far put forward appeared to be on the high side, and related to closed appliances, which were very different from the radiant gas fire. He hoped the day would never come when a dictator ordered the consumer to use this or that form of fuel. The solution lay in the acceptance by the consumer of certain principles of economic fuel utilization.

Mr. **C. A. Deas** (Tottenham and District) said that in his experience, while they awaited the economic success of complete gasification, which might not eventuate for 20 years or more, the best hot water service was given by a coke boiler in the winter and by gas in the summer.

Mr. **Davis** said that, in present circumstances, he himself advocated the system advocated by Mr. Deas.

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Progressive Practice or Specialized Planning*

By V. J. J. SIDDONS,

Engineer and Manager, Rawmarsh Gas Department

THE reticence of executives and representatives of undertakings both large and small to appreciate the point of view of others is deplorable, and unless a higher degree of tolerance and understanding is developed one must expect this attitude to be reflected within the undertakings under their direction, on one hand as between departments such as manufacture and distribution, and on the other among the personnel as between engineers and chemists, tradesmen and non-tradesmen, which must ultimately rebound to the discredit of the undertakings and the Industry as a whole. The forced attention imposed under the title of "post-war planning" has tended to widen this breach, resulting in sides being taken for and against such subjects as regionalization, nationalization, and similar suggestions apt to divide the Industry. While there may be sound reason for certain changes to occur, these in the main are capable of alteration under a programme of development without resorting to a wholsesale upheaval.

The impression being given under the heading "Post-War Planning" indicates that all that is necessary is to prepare for the cease fire, when the advent of a new world may be anticipated in which the Gas Industry must completely revolutionize its present practice to meet vastly changed conditions. Nothing will be farther from the facts, as it is certain that existing works must remain until their normal span of life has expired, and will continue throughout such period to occupy a substantial place in our national work. I am convinced there cannot be any clear-cut finish to the war. The state of uncertainty and unorganized intention now prevailing has indicated a structural weakness, and thereby enabled extraneous interests to encroach upon the Industry's affairs offering solutions to our problems, although these cannot be better understood than by those within the Industry. As a result these interests have taken opportunity to introduce personal and political opinion primarily with the intention of mounting the platform against monopolistic tendencies, and on this ground arrainging themselves against the Industry by stressing the need for national reorganization, with complete disregard of the good work and service the Industry has given and continues to render to the community. I would prefer to consider our activities in the direction of normal development greatly intensified under the title of "progressive practice" rather than "post-war planning."

Considering gas charges, let us take for example the incidence of a "step" rate of charge and the effect with domestic prepayment consumers, particularly where neighbours consume a similar quantity of gas within a few cubic feet of each other, but fall on either side of the dead line of a particular "step." The difference in the rebate will be considerable, and the lower consumer will feel she has not received all the money entitled to her when compared with her next door neighbour. A meter inspector's task is not always straightforward, and even though he may successfully explain the reason for certain differences, in many cases a feeling of suspicion is likely to remain against the undertaking. The natural outcome should be to adopt the "block" rate in preference to the "step" design.

As a further example, take the instantaneous type of water heater. Domestic water supply may not be the immediate concern of the gas undertaking, but where a consumer requests a water heater it should not be accepted for this to be fixed irrespective of the condition of the water supply. The undertaking is in duty bound to inspect the water supply as an elementary precaution, and if found unsatisfactory an installation of the apparatus should be refused until such time as complete satisfaction can be assured.

District Pressures

There are numerous small undertakings being conducted no less efficiently than some large ones, and it has been proved that size is no criterion of the standard of working performance. Recent examples have shown that a need for reorganization on up-to-date lines exists in large and apparently efficient concerns, which, however, have been found to be sadly understaffed. Repeated reference is made to-day regarding the low standard of performance of the small undertaking, but I contend there are many run quite as efficiently as numerous large concerns. In saying this I have no intention of elevating the small undertaking to a position enhanced beyond its rightful place, but in my opinion the practice of relegating them to the lower level of efficiency simply on the ground of size cannot be accepted unchallenged. Anticipating the criticism that one individual cannot be expected to cover every phase of manufacture, distribution, supply, and utilization, together with the control of labour and commercial management, I hasten to say those doing so are best qualified to reply, and from personal experience I give assurance of instances to-day where this is being carried out highly efficiently. The working personnel in small undertakings appears invariably to be looked down upon and generally considered much below standard; but my experience shows that an appreciative operative registers a closer interest and understanding of the requirements of gas utilization when encouraged by a wider variety of operations in which he can exercise his practical skill and abilities.

* From a Presidential Address to the Yorkshire Junior Gas Association.

DISCUSSION

Mr. Dawson (Huddersfield) asked Mr. Siddons what he thought about the flat rate of charge plus a service charge similar to that in use by electricity undertakings; what he thought was a good water pressure to use both for ordinary and multi-point water heaters, and if there were any practical methods which the fitter could use in the district to find whether the pressure was stable.

Mr. **Siddons** replied that he though the flat rate of charge had had its day, and in the future the Industry generally would go over to the tariff charge. So far as water pressure was concerned, his practice was to send the foreman to inspect the site. The best way was to work to the manufacturer's limits.

Mr. **H. Beaumont** (Meltham), referring to what Mr. Siddons had said in regard to the management of small undertakings, said that particularly in these times, when there was such a diversity of problems which had been set up through shortage of staff and shortage of sufficient retort-house room to make more gas which was required, he felt that at least it would be advantageous for some managers to become managers of smaller undertakings for a short period—*i.e.*, in direct management.

Mr. **C. A. Newham** (Leeds), referring to Mr. Siddons' point that small undertakings were generally regarded as inefficient, commented: "To my mind a small undertaking need not be inefficient at all. Undoubtedly they are handicapped in the respect that they have not the wealth behind them which the larger undertakings possess, but at the same time there is plenty of knowledge available for an engineer to run his works at a high standard of efficiency.

Mr. **W. T. Hird** (Sheffield) said that large units were in every way far more efficient than a group of small undertakings, and he was afraid everything was pointing to larger units.

Mr. **D. C. Henderson** (Bradford) said the future would be an age of specialists, and if engineers were not going to be trained as in the past, the new larger units which were obviously going to come would have to organize their training on more scientific lines than had been so up to now.

Mr. **Siddons** agreed that the Industry had been weakened substantially by the smallness of its units.

Mr. **C. S. Shapley** (Engineer and General Manager, Leeds Gas Department), present as an honorary member of the Association, said he happened to have been in charge of 13 small undertakings, and he wished to stress the efficiency he had noted in regard to the whole of the undertakings in Yorkshire. He declared that small undertakings could be efficiently run with proper technical assistance. It was extraordinary what could be done in a large way in a small undertaking. "All small undertakings cannot be linked up, but larger units are not necessarily as efficient as some of the small ones. Compared with other districts, the efficiency in Yorkshire ranks as well as anywhere, if not better," said Mr. Shapley.

Mr. **Wilkinson** (Huddersfield) commented that the young manager was able to carry out his own ideas. In a large undertaking, without his chief's co-operation such a young manager could be disheartened.

Mr. **Siddons**, replying, said he did not think it was a question of an undertaking being too large or unwieldy so much as a staff having its work appreciated.

A vote of thanks to Mr. Siddons was proposed by Mr. **C. Broome** (Halifax), seconded by Mr. **Hart** (Shipley). Leeds Corporation and Mr. Shapley were also warmly thanked for the facilities afforded for holding the meeting.

The Staff of the Rochdale Corporation Gas Department spent a happy evening on Nov. 30 when they met in the Old Clock Face Hotel for the purpose of making presentations to Mr. J. B. Stewart, Distribution Superintendent, and Mr. J. W. Whitehead, General Foreman, on the occasion of their retirement. Mr. C. H. Bamber, Engineer and Manager, spoke of the loyal service given during 29 years by Mr. Stewart, and 48 years by Mr. Whitehead. No matter what difficulties and danger attended the job on hand, they could always be relied upon to carry it through to the end with thoroughness. He then presented Savings Certificates to both recipients.

The Oxford and District Gas Company followed up the recent successful "Quick Meal" Demonstration to war-workers at Morris Motors, Ltd., factory, Cowley, by staging another enterprising show in the same canteen on Dec. 1, when their Demonstrator showed how the kiddies' Xmas sweet ration could be augmented by quickly made home-made sweetmeats. With the help of a gas cooker the Demonstrator made such attractive sweets as "Chocolate Fruit or Nut Clusters" and "Mock Marzipan," and showed how it was necessary to make only the smallest call on the family's rations and point allocations in order to obtain first-class results. It was announced that a fuller demonstration would be given of attractive Xmas fare at a special late (7 p.m.) show at the Company's Head Office, Therm House, St. Aldate's, Oxford, to-day.